



*FMD in Tunisia*  
*Update situation*  
*Critical review*  
*Vaccination programme*

Workshop on FMD vaccination strategy in North Africa  
Tunis, 30 – 31 March 2016



i. Introduction

ii. *Update situation* : Chronologie des évènements/ *Chronology of events*

iii. Etude critique / *Critical review/analysis*

iv. Programme de vaccination/ *Vaccination programme*



## ***Before April 2014***

- No clinical cases since 1999
- Mass vaccination campaign : *Sept.- Dec.*
  - Cattle & Small ruminants
- Epidemiological surveillance program
- May 2012 : FMD Official control program endorsed (OIE)

# Chronology of events



**Friday April 25**  
• Clinical suspicion



**Saturday April 26**  
• Diagnostic (IRVT) : RT-PCR



**Sunday April 27**  
• Sequestration- Slaughtering  
Perifocal vaccination



**Tuesday April 29**  
• Notification OIE

**OIE** Forum des animaux sains, Tunisie

Information received on 29/04/2014 from Dr Hichem Bouzgaha, Directeur Général, Services Vétérinaires, Ministère Agriculture, Tunis, Tunisia

Summary

Report type	Immediate notification
Date of start of the event	25/04/2014
Date of pre-confirmation of the event	26/04/2014
Report date	29/04/2014
Date submitted to OIE	29/04/2014
Reason for notification	Reoccurrence of a listed disease
Date of previous occurrence	03/1999
Manifestation of disease	Clinical disease
Causal agent	Foot and mouth disease virus
Serotype	Pending
Nature of diagnosis	Clinical, Laboratory (advanced)





## Infected Governorate

### Outbreak

- Vaccination Bov. Ov.
- Perifocal vaccination
- Disinfection
- Sequestration
- Slaughtering
- Prohibited milk sales

### Cattle market

- Vaccination

### Governorate boundary

- Vehicle disinfection
- Animal movement control



Photo Dr Haj Ammar



# Measures taken



## Non infected Governorate

Cattle market  
• Vaccination

Emergency vaccination  
• Cattle



## ☞ **International cooperation**

☞ **FAO (Eufmd, CMC), OIE, UE, Italy**

☞ **Don EU: 1 million doses (21 Aug. 2014)**

## ☞ **Scientific Committee**

☞ **Ministerial decision on Sept 1, 2014**

## ☞ **Vaccination campaigns**



# Vaccination campaigns



## 👉 **First campaign (April-August 2014)**

👉 **O manisa; O maghreb99, A22, SAT 2 (Cattle)**

👉 **O manisa; O maghreb99, SAT 2 (Small ruminant)**

👉 **Cattle**

	<b>2014</b>	<b>2013</b>
<b>CATTLE</b>	<b>543 444</b>	<b>407 177</b>
Small ruminants	818 727	3 713 008
<i>Fattening Unit</i>	<b>83 581</b>	

# Vaccination campaigns



## ☞ **Second campaign (Sept – Nov. 2014)**

☞ **O manisa; O maghreb99, A22, SAT 2 (Cattle)**

☞ **O manisa; O maghreb99, SAT 2 (Small ruminant)**

☞ **Small ruminant**

	<b>Nov. 2014</b>	<b>Total 2014</b>
<b>Cattle</b>	<b>91 687</b>	<b>635 131</b>
<b>SMALL RUMINANT</b>	<b>3 325 686</b>	<b>4 144 413</b>

# Vaccination campaigns



## 👉 Third campaign (First quarter 2015)

👉 O<sub>BFS</sub>, A Iran05, SAT 2 Eri (Cattle & Small ruminant )

👉 Cattle

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*1st quarter  
2015*

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**Estimated  
livestock**

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**Cattle**

580 490

680 450

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# Vaccination campaigns



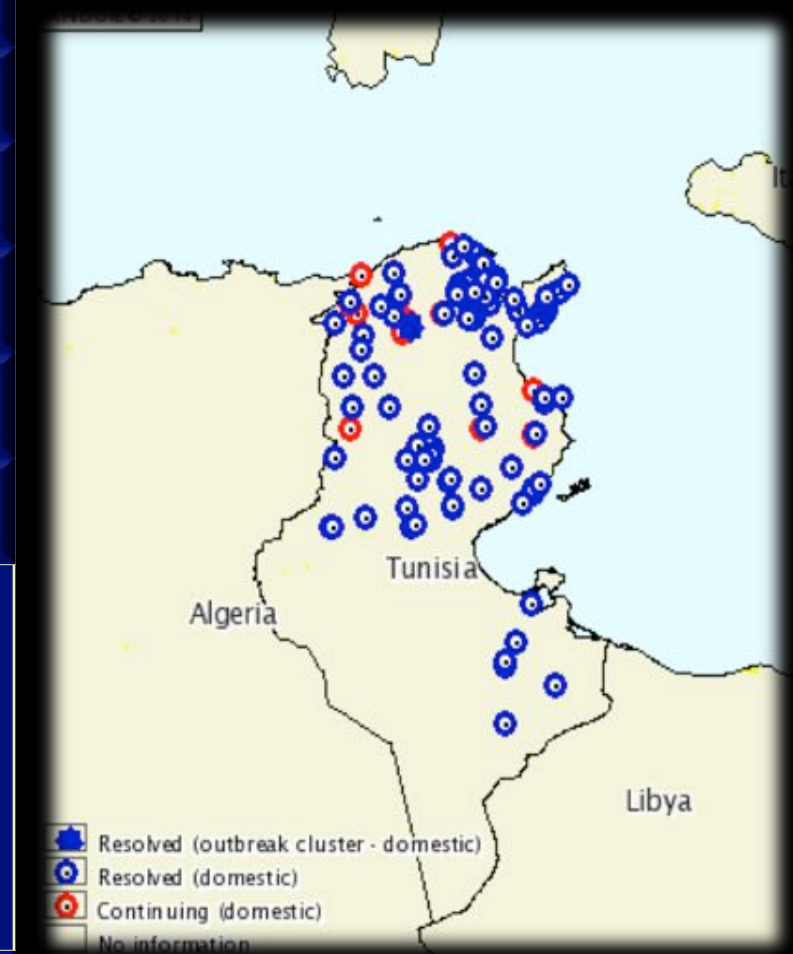
## 👉 Fourth campaign (Last quarter 2015)

- 👉 O<sub>BFS</sub>, A Iran05, SAT 2 Eri (Cattle & Small ruminant )
- 👉 O<sub>3039</sub>; O manisa; O maghreb99, A22, SAT 2 (Cattle)
- 👉 O<sub>3039</sub> O manisa; O maghreb99, SAT 2 (Small ruminant)
- 👉 Cattle & Small ruminant

	<i>Last quarter 2015</i>	<i>Estimated livestock</i>
<b>Cattle</b>	<b>365 362</b>	<b>680 450</b>
<b>Small ruminant</b>	<b>3 932 798</b>	<b>6 490 161</b>

# FMD outbreaks

	Nbr		Nbr		Nbr
Tunis	4	Sousse		Sfax	8
Ariana	9	Monastir	3	Gabes	
B.Arous	6	Mahdia	4	Gafsa	6
Manouba	12	Kairouan	6	Tataouine	5
Bizerte	5	Kasserine	6	Kebili	
Nabeul	18	Sidi Bouzid	23	Tozeur	
Zaghouan	4			Medenine	1
Béja	19				
Jendouba	6				
Le Kef	4				
Siliana	1				
<b>Total</b>			<b>150</b>		



WAHIS nov 2014

Notification to OIE : Last outbreak Novembre 2014

# *Total animal affected*

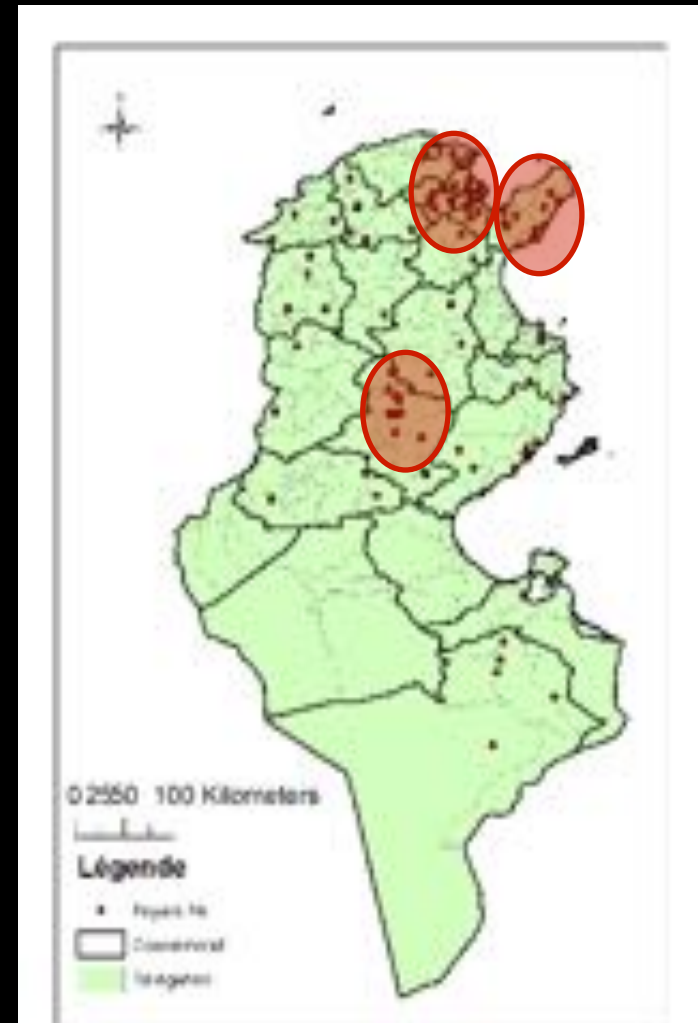
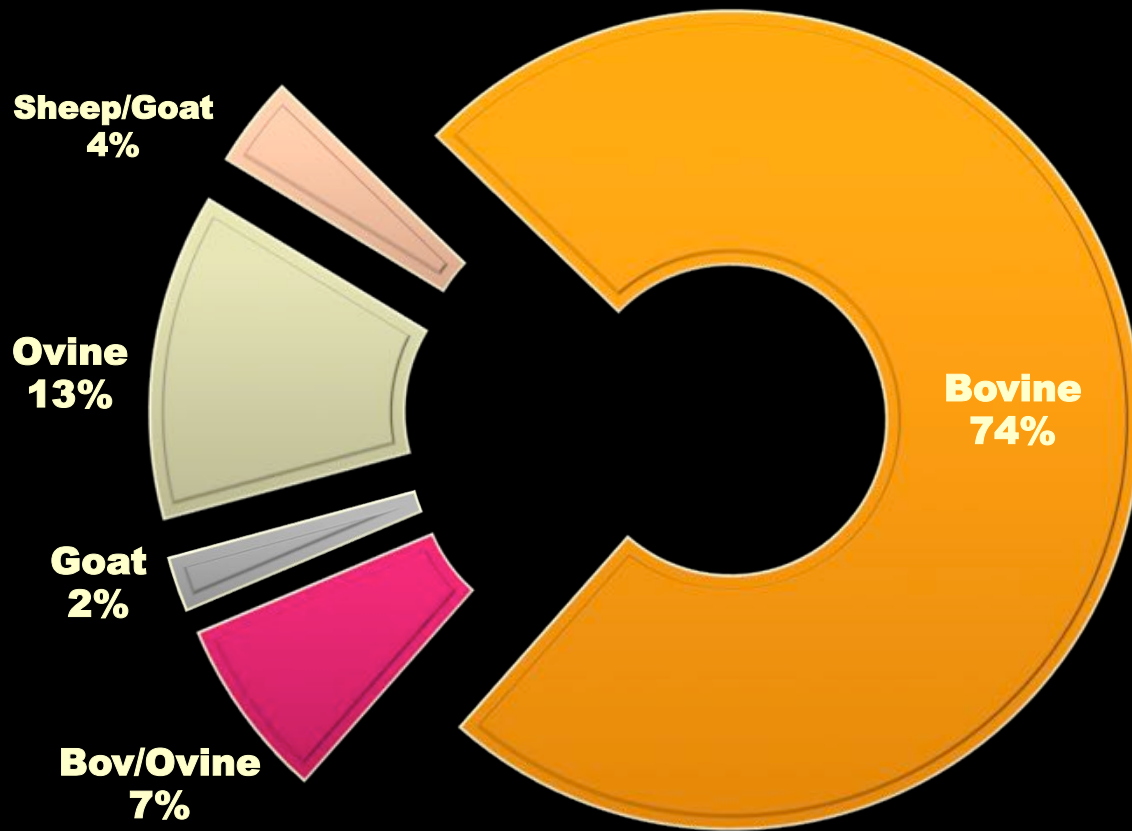


<b>Species</b>	<b>Susceptible</b>	<b>Cases</b>	<b>Deaths</b>
<b>Cattle</b>	<b>2 590</b>	<b>460</b>	<b>-</b>
<b>Sheep/Goat</b>	<b>7 952</b>	<b>710</b>	<b>-</b>

# *Outbreak statistics*

<b>Species</b>	<b>Apparent morbidity rate</b>	<b>Apparent mortality rate</b>
<b>Cattle</b>	<b>17.8</b>	<b>0</b>
<b>Sheep/Goat</b>	<b>8.9</b>	<b>0</b>

# Outbreaks / species



# *Diagnostic test results*



- i. Institut de la Recherche Vétérinaire de Tunisie**
- ii. FAO/OIE reference lab for FMD (Brescia – Italy)**
- iii. WRL FMD – Pirbright (UK)**



# *Diagnostic test results*



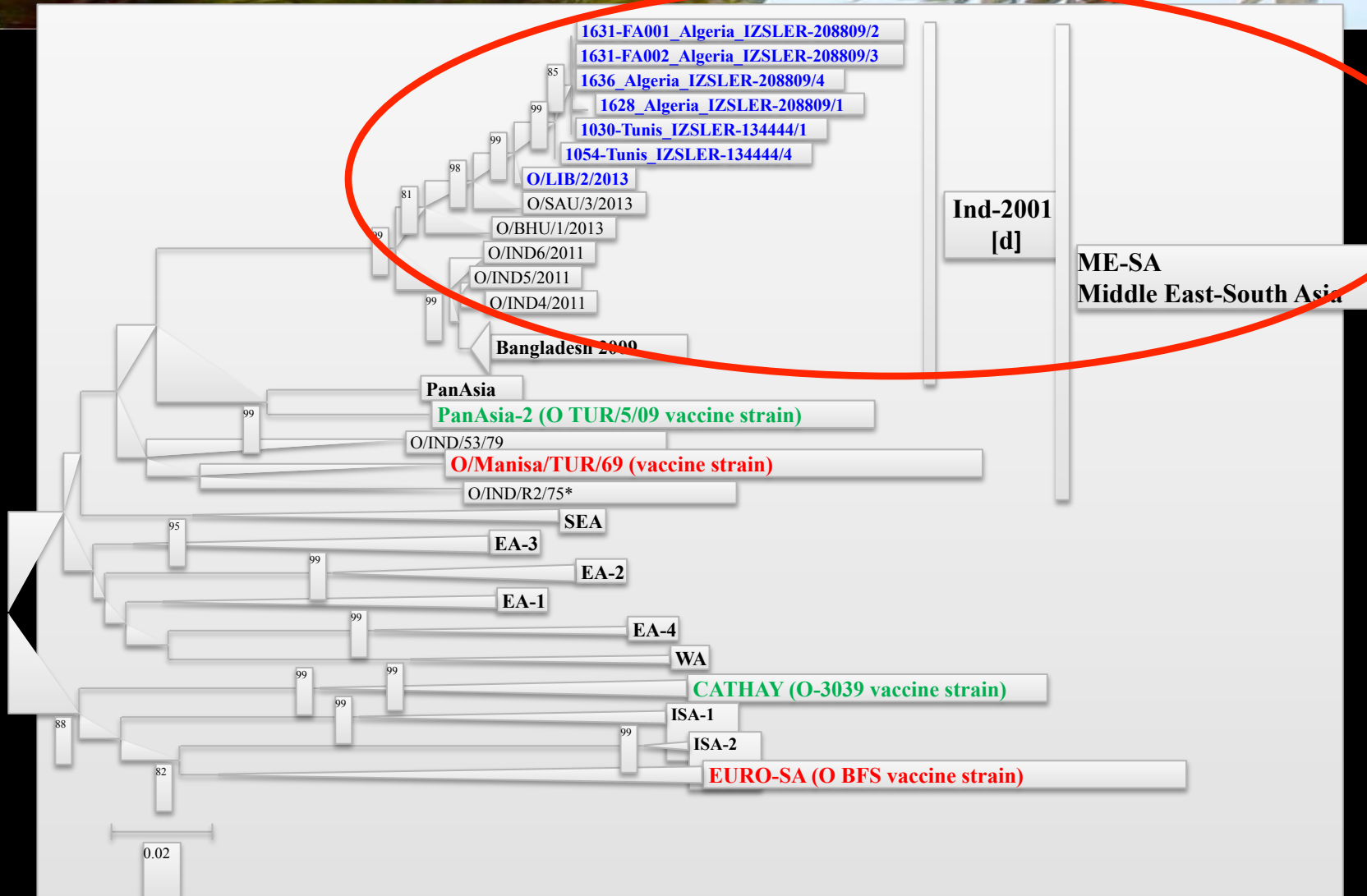
**Topotype : Middle East – South Asia (ME-SA)**

**Genotype : Ind 2001 d**

**O / ME-SA / Ind 2001d**

- Restricted to Indian sub-continent**
- Caused FMD outbreaks : Iran2009; UAE  
2008-09;Oman&Bahrain 2001; Kuwait 1997**
- LIBYA 2013**
- NEW VIRUS INCURSION : Major epidemiological event**

# Phylogenetic tree



# Diagnostic test results



👉 **TUN/1031/2014 (Somaâ)**

👉 **TUN/1054/2014 (Sidi Bouzid)**

**99 % identity (VP1) O/LIB/2013 strain  
isolated in Libya in 2013**

**Report on FMDV O in  
Tunisia in 2014**  
Batch: WRLMEG/2014/00010

◆ indicates viruses in this batch

99  
◆ O/TUN/1031/2014\* (ZSLER)  
◆ O/TUN/1054/2014\* (ZSLER)  
O/LB/12/2013  
O/LB/11/2013  
O/LB/10/2013  
O/LB/4/2013  
O/LB/13/2013  
O/LB/5/2013  
O/LB/17/2013  
O/LB/7/2013  
95 O/LB/22/2013

# Diagnostic test results



TUN/1031/2014 (Somaâ)

TUN/1054/2014 (Sidi Bouzid)

WRL Pirbright (Sept. 17, 2014)

**100 % identity (VP1) O/ALG/2014 strain  
isolated in Algeria in 2014**

## Report on FMDV O in Tunisia in 2014

Batch: WRLFMD/2014/00029

◆ indicates viruses in this batch

Software: MEGA 6.06

Analysis

Analysis ----- Phylogeny Reconstruction

Scope ----- All Selected Taxa

Statistical Method ----- Neighbor-joining

Phylogeny Test

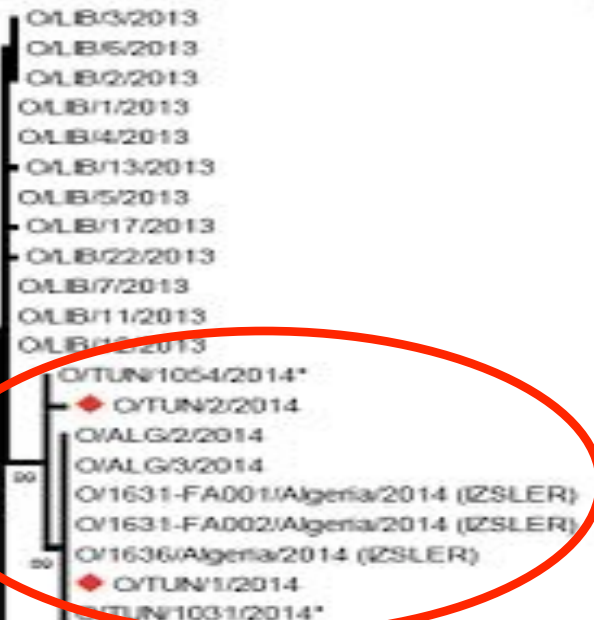
Test of Phylogeny ----- Bootstrap method

No. of Bootstrap Replications ----- 1000

Substitution Model

Substitutions Type ----- Nucleotide

Model/Method ----- Kimura 2-parameter model



# Diagnostic test results



- Vaccine Matching Test

## WRL Pirbright (Sept. 30, 2014)

Field isolate	O 3039	O Manisa	O/TAW/98	O/TUR/5/09	O BFS
<b>TUN 01/14</b>	0,27	0,15	0,29	0,56	0,15
LIB 1/2013	0,51	0,14		> 0,84	
LIB 7/2013	> 0,85	0,16		> 0,86	
LIB 17/2013	0,41	0,14	0,21	0,45	

 **MATCHING**

 **NO MATCHING**

$r1 \geq 0,3$  suggests close relationship; likely confer protection  
 $r1 < 0,3$  suggests field isolate so different; unlikely to protect



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☠ **Social; cultural & economic reasons**

☠ **Closing animal markets**

☠ **Control animal movements**  
(Identification, traceability)

☠ **Stamping out infected animal (No funds available to compensate)**

**Withdrawal of the endorsement of FMD official control programme**



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*Thank you*





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- ***Species /Espèces :***
  - ***Cattle & Small Ruminant / Bovins & Petits Ruminants***
- ***Mise en œuvre / Implementation***
  - ***Public / Private (28 %)***



## **Avant / Before 1989:**

- **Cattle / Bovins: A - O - C**

## **1989**

- **Cattle / Bovins: A - O - C**
- **Small ruminant / Petits ruminants: O**

## **2003 (Libya notification)**

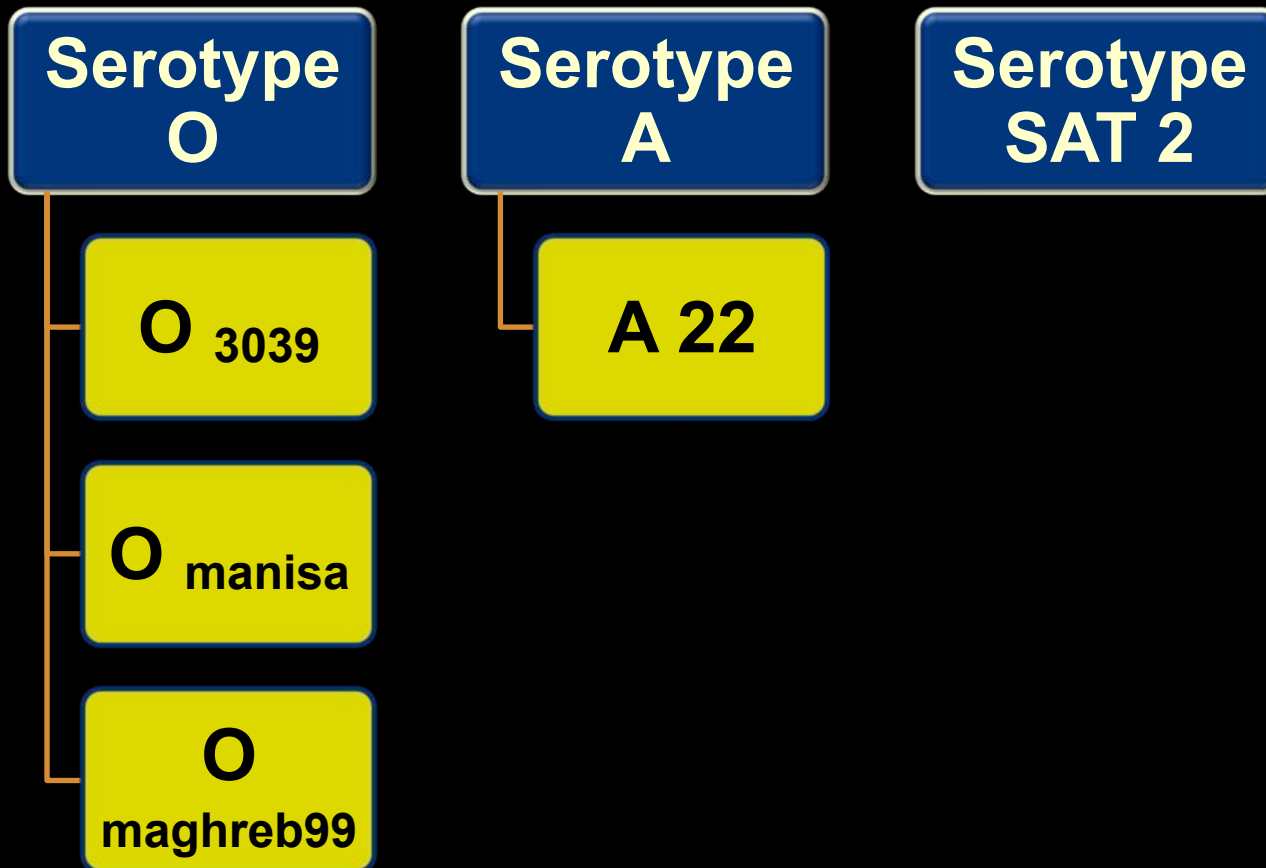
- **Cattle / Bovins: O<sub>manisa</sub>; O<sub>maghreb99</sub>, A22, SAT 2**
- **Small ruminant/ Petits ruminants: O<sub>manisa</sub>; O<sub>maghreb99</sub>, SAT 2**

## **2014 ( UE donation)**

- **Bovins et Petits ruminants / Cattle & Small ruminant :**  
**O<sub>BFS</sub>, A<sub>Iran05</sub>, SAT 2<sub>Eri</sub>**

# *Current strains used in the vaccine*

2015 – 2016 - 2017





*Thank you*



# Current strains used in the vaccine



## Palestine (2013/14)

- O-PanAsia
- A-Iran-2005

## Egypte

- 2012/13: A-Iran-2005 & A-Afr G-IV, Sat-2, O-PanAsia & O-EA3

## Irak (2013)

- A-Iran-05
- Asia-1

## Iran (2014)

- A-Iran-05
- O PanAsia-2
- Asia-1

## Emirates AU:

- 2013: O PanAsia-2
- 2014: O-India-2001

## Arabie Saoudite (2013/14)

- O-India-2001

**Zone endémique ???**





**Algérie (July 2014)**

- O-India -2001

**TUNISIE (April 2014)**

- O-India-2001

**Libya (2013)**

- O-India-2001

**Marocco (2015)**

- O-India -2001



**Libya**

2003 FMDV-SAT2

- 2009 FMDV -A

- 2010 FMDV-O

- 2012 FMDV—SAT2

**Zone endémique ???**

*Border endemic area*